

DAMAGE ASSESSMENT TO PLAQUEMINES PARISH FEDERAL LEVEES.

The information presented in this section has been gleaned from a number of disparate sources. These include ‘boots-on-the-ground’ inspections, numerous helicopter fly-over inspections, and observations made during a methodical, slow-paced, helicopter based LIDAR survey of the flood protection systems in the Plaquemines Parish, east and west banks. The area of interest is shown on the 4 maps that immediately follow.

1. Main Line Mississippi River Levees East Bank:

New Orleans to Bohemia – Reach C. (Approximate Mississippi River miles 81 to 60)

This reach of levee is part of the Mississippi River Tributaries (MRT) project and is not part of the New Orleans to Venice Hurricane Protection Project. This information is included here for completeness. The bulk of the damage in this reach is riverside paving block damage caused by debris or by barge impact. Approximately 300-feet of paving block is damaged and needs repairs or replacement. Figures 1 and 2 show typical paving block damage. There is also a minor amount of scour at the crown and top of the landside slope. Photos 3 and 4 are typical of this scour.

Bohemia to Phoenix (Approximate Mississippi River miles 60 to 44.5)

The bulk of the damage in this reach is riverside paving block damage and minor crown erosion. Approximately 3.4-miles of paving block and 5.9-miles of the crown needs repairs or replacement. Figures 3 and 4 show the minor crown erosion.



Figure 1



Figure 2



Figure 3



Figure 4

2. Hurricane Protection Back Levees East Bank:

Phoenix to Bohemia – Reach C. (Approximate Mississippi River miles 60 to 44.5)

Damage to this levee consists of erosion damage to the levee crown and various, small reaches of the landside slope. Photos 5 and 6 portrays the heaviest erosion damage to the earthen levee. Approximately 2.6 miles of crown erosion and less than 500-feet of riverside and landside slope erosion is identified.



Figure 5



Figure 6

The back levee sustained a complete breach with associated scour hole between the La Heche and Bellevue pumping stations. A ground survey conducted after the hurricane shows that the breach is 190-foot wide at the levee centerline and the scour hole extends to -21 NGVD. Figure 7 (taken on/about 15 September 2005) shows this breach with an intermediate level of protection established across it.



Figure 7

Two pumping stations in the district evacuate storm water to the Gulf. These are known as the Bellevue Pumping Station and the Point A La-Hache Pumping Station. Erosion damage occurred to both ends of the external I-wall where the levee ties into the pump station superstructure. Figures 8 and 9 illustrate this erosion.



Figure 8



Figure 9

3. Summary of Plaquemines Parish East Bank Pumping Stations Conditions

The following field report was received on 29 September. Although the pump stations are not part of the New Orleans to Venice project, this information is included for completeness.

- Bellevue Pump Station: The station has two permanent pumps, both operational, and is operating at its full capacity of 516 cfs.
- Pointe A La Hache East Pump Station: The station has two permanent pumps with a capacity of 500 cfs and is not operational. The lower level of the station is flooded and the station needs a minimum of 60 days to become operational.

4. Summary of Plaquemines East Bank Damage

Estimates of earth work volumes, lengths of paving block damage, and lengths of damaged sheetpile and their approximate locations with respect to river mile are itemized on Table 1. This table tracks riverside and landside slope erosion, crown erosion, floodwall damage, paving block damage and breaches. Estimated volumes are based on damage lengths and assumed unit volumes are based on the reconnaissance described earlier. For instance: Minor damage to the crown is assumed to be 8-inches deep and 12-foot wide resulting in a unit volume of 8-ft²/ft. For an assumed length of 100-ft, the total volume of minor crown erosion is computed to be 29.6 yd³.

These estimates assume that sand will be placed into the deep scour holes up to elevation zero. Above elevation zero, all construction will be completed with compacted clay. The estimates of breach repair also include volumes for riverside rock cofferdams and 60-foot deep sheetpile cutoff walls.

The table separates damages between the main-line levee immediately adjacent to the Mississippi River, and the hurricane back levees. The main line levee damage must

also be divided between the Mississippi River and Tributaries (MRT) project and the hurricane protection (HPL) project. CEMVN-ED-FD indicates that the required hurricane protection was provided by raising the earthen embankment of the MRT levee and adding various reaches of sheetpile and concrete capped sheetpile walls. Since at this time, the exact depth of all scour is unknown, certain assumptions must be made to separate the damage between the MRT and HPL projects.

Assuming the uppermost portions of the main line levee is associated with the HPL, this PIR assumes that damage to the uppermost embankments and floodwalls will be associated with the hurricane protection system. Specifically, these assumptions are:

- 100% of crown erosion assigned to the HPL.
- 100% of minor erosion in the landside/riverside slopes assigned to the HPL.
- 100% of sheetpile/concrete capped sheetpile wall damages assigned to the HPL.
- 100% of damage to back levees (including breaches) assigned to the HPL.
- 50% of major erosion in the landside/riverside slopes assigned to the HPL.
- 25% of extreme damage to landside/riverside slopes assigned to the HPL.

This table shows the estimated total volumes of damage to the Plaquemines Parish East Bank and assumed distribution between the MRT and HPL projects. The total volumes include a 25% contingency.

Material	Total	HPL Portion	MRT Portion
Clay:	22,123 (yd ³)	22,123 (yd ³)	0 (yd ³)
Sand:	44,798 (yd ³)	44,798 (yd ³)	0
Rock:	10,061 (tons)	10,061 (ton)	0
Sheetpile:	15,000 (ft ²)	15,000 (ft ²)	0
Slope Paving	687,375 (ft ²)	0 (ft ²)	687,375 (ft ²)
Road Stone	35,200 (tons)	0 (tons)	35,200 (tons)

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5. Main Line Mississippi River Levees West Bank:

New Orleans to St. Jude. (Approximate Mississippi River miles 81 to 47.5)

This reach of levee is part of the Mississippi River Tributaries (MRT) project and is not part of the New Orleans to Venice Hurricane Protection Project. This information is included here for completeness. Damage is confined to river miles 62 to 47.5 and consists of 0.8-miles of riverside paving block damage, 2.4-miles of minor crown erosion, 5.4-miles of minor landside slope erosion, and 0.4-miles of major and extreme landside slope erosion. Paving block damage is similar to that previously described. There are no breaches or flood walls identified in this reach. Figures 10 and 11 show typical minor crown and landside slope erosion damage. Figure 12 shows the extreme landside damage near Point Celeste.



Figure 10



Figure 11



Figure 12

St. Jude to City Price. (Approximate river miles 47.5 to 43.5).

This reach of levee is part of the Mississippi River Tributaries (MRT) project and is not part of the New Orleans to Venice Hurricane Protection Project. This information is included here for completeness. Damage in this reach is confined to river miles between 43.5 and 45.5 and consists of 0.6-miles of riverside paving block damage and 3.1-miles of minor landside slope erosion.

Reach A. (Approximate river miles 43.5 to 31).

This reach of levee experienced 2.9-miles of paving block damage, 1.7-miles of crown erosion, 5.5-miles of landside slope, 0.4-miles of riverside slope erosion, and erosion at the ends of and behind sheetpile and concrete capped hurricane protection walls

(2.8-miles). The typical erosion damage at the ends of sheetpile and concrete capped hurricane protection walls is shown in Figures 13 and 14.



Figure 13



Figure 14

Notice the soil erosion evident behind each of these walls. This erosion continues for the entire length of wall indicating a significant overtopping. A closer view of this typical erosion is shown in Figure 15.



Figure 15

Reach B-1 (Approximate river miles 31 to 20).

This reach of levee experienced little or no paving block damage, nor crown or riverside slope erosion. There is 5.3-miles of landside slope erosion and 2-miles of damaged sheetpile and concrete capped floodwall as well as attendant erosion behind the walls due to overtopping. Figures 16 and 17 illustrate these failures. Although all walls did not fail as dramatically as shown in figure 16, they do manifest some level of distress.



Figure 16



Figure 17

Reach B-2 (Approximate river miles 20 to 10).

This reach of levee experienced no paving block damage. It did sustain 4.5-miles of minor riverside slope erosion, 4.2 miles of minor crown erosion, and 4.0-miles of landside slope erosion. The flood gate closure structure at the end of the Empire marina is stuck in the open position.

6. Hurricane Protection Back Levees West Bank:

St. Jude to City Price. (Approximate river miles 47.5 to 43.5).

The observed damage is the signature erosion at the ends of the concrete transition wall at the Diamond pump station. Figure 18 shows the Diamond pump station and figure 19 shows a closer view of the erosion. This erosion is similar to the erosion at other walls (see figures 9, 13, and 14). A detailed inspection of the pump station must still be completed.



Figure 18



Figure 19

Reach A. (Approximate river miles 43.5 to 31).

The back levee sustained minor damage to 0.9 miles of crown, major damage to 0.6 miles of marsh side slope, and levee breaches including: near the Hayes Pump station, marsh side erosion downstream of the Hayes pump station, the breach near Nairn (Shell Oil), and downstream of Nairn. Some of these breaches were confined to the embankment and others created substantial scour holes. Figure 20 shows the breach at Nairn (Shell Oil). A measured profile along the levee centerline shows that the scour hole is 125-feet wide. An incomplete scour hole profile shows that it is a least 14-feet deep below the prevailing ground surface.



Figure 20

Reach B-1 (Approximate river miles 31 to 20).

The breach at the Sunrise Pumping Station (Figure 21) is located in this back levee. This breach destroyed about 200-feet of structural T-Wall. The ground survey at this breach shows that it is 180-feet wide along the levee centerline, 500-feet long from riverside to landside, and a 25 to 30-foot deep scour hole. The back levee also sustained ruinous damage to sheetpile walls in the vicinity of the Empire lock and canal, and to the levee crown on either side of the sheetpile. Figures 22 and 23 show the failed sheet piling in the back levee near the Empire Lock. In the remaining levee reach downstream of the Sunrise Breach, the back levee showed no visible damage. At the time of this writing, the Empire flood gate was still stuck in the open position



Figure 21



Figure 22



Figure 23

Reach B-2 (Approximate river miles 20 to 10).

This reach of back levee experienced no visible damage.

7. Summary of Plaquemines Parish West Bank Pumping Stations Conditions

The following report was received from the field on 29 September. The pump stations are not part of the New Orleans to Venice project. This information is included for completeness.

- Pointe A La Hache West Pump Station: located downstream of Bellevue. The station has three pumps with a capacity of 48 cfs, all operational,.
- Diamond Pump Station: located upstream of Bellevue. The station has two pumps at a capacity of 256 cfs, both operational, and is not operating either pump.
- Hayes Pump Station: located upstream of Bellevue north of the Shell Pipeline breach site. The station has two permanent pumps with a combined capacity of 500 cfs, though neither are currently operational.
- Gainard Woods Pump Station: located on the west bank downstream of the Shell Pipeline breach site. The station has a capacity of 408 cfs through four pumps, three operational, and is currently not operating.
- Sunrise Pump Station 2: located on the west bank downstream of Gainard Woods Pump Station. The station's two permanent pumps operated a their full capacity of 290 cfs.

- Sunrise Pump Station 1: located on the west bank downstream of Sunrise Pump Station 1. The station is currently operating its two permanent pumps at 200 cfs.
- Grand Laird (Buras) Pump Station: located on the west bank downstream of the Sunrise Pump Stations. The station has four permanent pumps, three operational, and operating three pumps at 375 cfs.
- Duvic (Venice) Pump Station: located on the west bank downstream of the Grand Laird (Buras) Pump Station. The station has two permanent pumps, both operational, and is operating at a full capacity of 560 cfs.

8. Summary of Plaquemines West Bank Damage

Estimates of earth work volumes, lengths of paving block damage, and lengths of damaged sheetpile and their approximate locations with respect to river mile are itemized on Table 2.a and Table 2.b. This table is based on the same estimates and assumptions described earlier for Table 1.

The table below shows the estimated total volumes of damage to the Plaquemines Parish West Bank and assumed distribution between the MRT and HPL projects. The total volumes include a 25% contingency.

Material	Total	HPL Portion	MRT Portion
Clay 5-mi Haul:	482,350 (yd ³)	294,565 (yd ³)	142,236 (yd ³)
Clay 10-mi haul		147,282 (yd ³)	71,130 (yd ³)
Sand:	79,489 (yd ³)	99,361 (yd ³)	0
Rock:	21,464 (tons)	20,123 (tons)	0
Sheetpile:	1,549,125 (ft ²)	420,000 (ft ²)	0
Slope Paving	866,250 (ft ²)	0 (ft ²)	866,250 (ft ²)
Road Stone		82,133 tons	0
Structural T-Wall	200-ft	200-ft	0

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